

REMARKS

The enclosed is responsive to the Examiner's Office Action mailed on November 25, 2009. By way of the present response applicants have: 1) amended claims 1, 3, 5, 15, 18, and 26; 2) added no claims; and 3) canceled no claims.

Applicants have amended the claims to more clearly recite the claimed subject matter. Support for the amendment to claim 1 is supported by the specification as originally filed, e.g., at least in page 11, lines 21-24. Applicants have amended the specification to correct typographical errors. No new matter has been added.

Reconsideration of this application as amended is respectfully requested.

Claim Rejections – 35 U.S.C. §102

Claims 1-3, 9, 11-13, 15, 18, 19, 21, 23-26, and 28 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,649,437 by Yang et al., (hereinafter "Yang"). Applicants do not admit that Yang is prior art and reserve the right to swear behind Yang at a later date.

Applicants respectfully submit that Yang fails to disclose

forming a first ohmic contact layer on a first surface of the multiple epitaxial layers, the first surface being remote from the substrate, the first ohmic contact layer comprising multiple metal layers and being a mirror at a junction between the first surface of the multiple epitaxial layers and the first ohmic contact layer.

(Amended claim 1).

The Examiner alleges that the combination of Yang's ohmic contact metal 40, diffusion barrier layer 30, and the metal reflection layer 28 are equivalent to the

above claimed feature. Applicants respectfully disagree. An ohmic contact layer is suitable as an ohmic contact - i.e., suitable to form a connection between a semiconductor and an external electrical contact so that the current-voltage (I-V) curve of the device is linear and symmetric (if the I-V characteristic is non-linear and asymmetric, the contact is not ohmic, but is a blocking or Schottky contact). Yang's ohmic contact metal 40 is an ohmic contact. Yang does not, however, state that diffusion barrier layer 30 and the metal reflection layer 28 are a part of an ohmic contact layer or that they provide the characteristics/properties of an ohmic contact. The proximity of diffusion barrier layer 30 and metal reflection layer 28 to ohmic contact metal 40 does not, in and of itself, create an ohmic contact layer including all three. Yang only includes the reference of "ohmic contact" in reference to ohmic contact metal 40.

Even if Yang's ohmic contact metal 40, diffusion barrier layer 30, and the metal reflection layer 28 were considered to be the equivalent of an ohmic contact layer as alleged by the Examiner, Yang still fails to disclose that the first ohmic contact layer forms a mirror at a junction between the first surface of the multiple epitaxial layers and the first ohmic contact layer. In contrast to amended claim 1, Yang discloses that a diffusion barrier layer 30 and the ohmic contacts 40 lie between the reflection layer 28 and the epitaxial layers.

Accordingly, applicants respectfully submit that the rejection of claim 1 has been overcome.

The Examiner alleges that Yang discloses the features of claim 2 in the description between column 2, line 42 and column 3, line 10 (i.e., the entire description of Figure 1) and in Figure 1. Yang does not, however, specifically

disclose an “adhesion layer” or a “seed layer” as claimed and the Examiner has not articulated how these features are disclosed. Furthermore, claim 2 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 2 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 3 in the description in column 2, lines 42-64 and in Figure 1. In rejecting claim 3, the Examiner refers to Yang’s metal reflection layer 28 as the seed layer. In rejecting claim 1, however, the Examiner alleges that metal reflection layer 28 is a part of the first ohmic contact layer. Applicants respectfully request that the Examiner explain how Yang’s layer 28 is both a part of the ohmic contact layer and, at the same time, the seed layer that is coated upon the first ohmic contact layer.

Additionally, applicants submit that Yang fails to disclose that a seed layer is patterned with photoresist patterns before the electroplating, and the electroplating of the relatively thick layer is between the photoresist patterns (and the Examiner has not specifically articulated how Yang discloses this feature). Yang simply discloses general electroplating to form what appears to be a featureless metal substrate layer 26.

Furthermore, claim 3 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 3 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 9 in the description in column 2, lines 42-64 and in Figure 1. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that the seed layer is electroplated without patterning, patterning being performed

subsequently by photoresist patterning and then wet etching. Furthermore, claim 9 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 9 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 11 in the description in column 2, lines 42-64 and in Figure 1. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that patterning is by laser beam micro-machining of the relatively thick layer.

Furthermore, claim 11 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 11 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 12 in the description in column 2, lines 42-64 and in Figure 1. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that the relatively thick layer is of a height no greater than the photoresist height.

Furthermore, claim 12 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 12 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 13 in the description in column 3, lines 2-21. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that the relatively thick layer of thermally conductive metal is electroplated to a height greater than the photoresist and is subsequently thinned, thinning being by polishing or wet etching. The cited portion of Yang refers to the removal of the GaAs substrate 38, not a

relatively thick layer of a thermally conductive metal adjacent to the first ohmic contact layer. Furthermore, claim 13 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 13 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 15 in the description in column 3, lines 11-21 and in Figure 2. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that there is included the forming on a second surface of the multiple epitaxial layers a second ohmic contact layer, the second ohmic contact layer being selected from the group consisting of: opaque, transparent, and semi-transparent, the second ohmic contact layer being one of blank and patterned, bonding pads being formed on the second ohmic contact layer. While Yang discusses a second ohmic contact metal 42, there is no discussion in Yang of bonding pads being formed on the second ohmic contact layer. Furthermore, claim 15 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 15 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 18 in the description in column 3, lines 2-21 and in Figure 2. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, the deposition of wire bond pads. Furthermore, claim 18 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 18 has been overcome for at least the reasons set forth above.

Claims 19, 21, and 23 are dependent upon claim 1, and include additional features. Accordingly, applicants submit that the rejection of claims 19, 21, and 23 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 24 in the description in column 2, lines 42-64 and in Figure 1. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that the first ohmic contact layer is on p-type layers of the multiple epitaxial layers. In contrast, Yang discloses that upper cladding layer 32 is an n-type layer. (Yang, col. 2, lines 51-52). Furthermore, claim 24 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 24 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 25 in the description in column 2, lines 42-64 and in Figure 1. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that the second ohmic contact layer is formed on n-type layers of the multiple epitaxial layers. In contrast, Yang discloses that the lower cladding layer 36 is a p-type layer. (Yang, col. 2, line 49). Furthermore, claim 25 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 25 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 26 in the description in column 2, lines 42-64 and in Figure 1. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that dielectric films are deposited on the multiple epitaxial layers and openings are cut in the dielectric films and second ohmic contact layer and bond pads deposited on the

multiple epitaxial layers. Furthermore, claim 26 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 26 has been overcome for at least the reasons set forth above.

The Examiner alleges that Yang discloses the features of claim 28 in the description in column 2, lines 41-64 and column 3, lines 3-10. Yang fails to disclose, and the Examiner has not specifically articulated how Yang is interpreted to disclose, that the multiple epitaxial layers comprise multiple GaN-related layers. In contrast, Yang discloses GaAs-related layers. Furthermore, claim 28 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 28 has been overcome for at least the reasons set forth above.

Claim Rejections – 35 U.S.C. §103

Claim 5 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Yang. The Examiner alleges that a height in the range 15 to 500 micrometers, a thickness in the range 3 to 500 micrometers, and a spacing in the range of 200 to 2,000 microns would be obvious in light of Yang. In particular, the Examiner cites MPEP §2144.05 and *In re Woodruff*. Applicants respectfully disagree with the Examiner's assertion and interpretation of MPEP §2144.05 and *In re Woodruff*. The MPEP §2144.05 in its citation of *In re Woodruff* states "[i]n the case where the **claimed ranges 'overlap or lie inside ranges disclosed by the prior art'** a prima facie case of obviousness exists." (emphasis added). In contrast to the situation cited, Yang does not disclose a range and, therefore, there is no overlap of ranges between Yang and claim 5. The Examiner's statement that applicants must show

that the chosen dimensions are critical is not correctly applied. A showing of the criticality of the claimed range is used to “rebut a prima facie case of obviousness **based on overlapping ranges.**” (MPEP §2144.05 III) (emphasis added).

Furthermore, claim 5 is dependent upon claim 1, and includes additional features. Accordingly, applicants submit that the rejection of claim 5 has been overcome for at least the reasons set forth above.

CONCLUSION

Applicants respectfully submit that in view of the amendments and arguments set forth herein, the applicable objections and rejections have been overcome.

Applicants reserve all rights under the doctrine of equivalents.

Pursuant to 37 C.F.R. 1.136(a)(3), applicants hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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